REMARKS

SUMMARY:

The present application sets forth original claims 1-22, of which claims 1 and 12 are independent claims. Original Claims 3 - 9 and 14 - 20 are objected to, but have been indicated as allowable if rewritten in independent form to include limitations of the base claim and any intervening claims. Original claims 2 and 13 have been objected to as allegedly failing to further limit the subject matter of a previous claim. Original Claims 1, 2, 10-13, 21 and 22 stand rejected under 35 U.S.C §102(e) as being allegedly anticipated by U.S. Patent Application Publication No. 2003/0214419 (Reindl).

Responses to the rejections summarized above (including traversal of each prior art rejection) are hereafter provided with respect to each individual argument presented by the Examiner.

OBJECTION TO ORIGINAL CLAIMS 2 and 13 (35 CFR 1.75(c)):

Original claims 2 and 13 have been objected to under 35 CFR 1.75(c), as being of improper form for allegedly failing to further limit the subject matter of a previous claim. Specific reference has been made to the language "the processor is configured to perform a signal analysis based on a selected range of harmonics of the reflected signal received by the radar transceiver" it being alleged that the language appears to have been positively recited in claims 1 and 12.

While Applicants do agree that similar language appears in claims 1 and 12, Applicants respectfully point out that the specific language recited in claims 2 and 13 does not appear in the parent claims. More specifically, claims 1 and 12 recite that the processor is configured to perform a signal analysis based on "selected harmonics of the reflected signals" (emphasis supplied) while the specific language of claims 2 and 13 recite "a selected range of harmonics" (emphasis supplied).

With reference to Applicants' specification, and, in particular to paragraph [0040], a discussion of a "windowing" concept and a "piecewise functional dependency" was

presented outlining the various phenomena that might be monitoring by observation of various harmonics as follows, in part:

The effects pointed out demonstrate the need for windowing, where windowing means performing analysis for the varied phenomena of interest by selecting ranges of harmonics to study. For example, tread belt separation and uneven wear could be measured by studying harmonics ranging from the 3rd harmonic to the nth harmonic, where n is the fundamental harmonic related to the tread pattern, using methods described above. Tread wear could be studied in the tires under study by choosing the harmonics from the nth harmonic to the mth harmonic, where m is the upper overtone of the tread pattern energy, and measuring the average energy. Balance and alignment could be studied by observing harmonics 1 and 2. In an exemplary embodiment, n may be the 60th harmonic while m may be the 120th harmonic. This ability to identify tread belt separation, or other tire anomalies, using a windowed approach based on ranges of harmonics leads to the suggestion of a piecewise functional dependency such as:

$$G_j = \begin{cases} \dfrac{f(CM_j)}{G_0\, g(E_{Avj})} & \text{for } CM_0 / a < CM_j \le CM_0 \\ \dfrac{l(CM_j)}{G_0\, m(E_{Avj})} & \text{for } \mathrm{CM_j} < CM_0 / a \end{cases} \qquad \text{Eq. 6}$$

Where $f(CM_j)$, $g(E_{avj})$, $l(CM_j)$, and $m(E_{avj})$, are empirically determined functions which provide an adequate gauge and can be empirically determined weighting functions to provide adequate sensitivity to the phenomena under study. In Equation 6, a is a real value constant chosen appropriately to correctly partition the behavior, since it is observed that for different values of the center of mass one can expect differences in the evolution of various phenomena. The piecewise function defined in Equation 6 provides a template for a large number of functions that can be used to measure tread belt separation, tread wear, and uneven wear and do so with adequate discrimination.

With specific reference to the claims, it will be noted that claims 1 and 12 speak of an analysis based on "selected" harmonics while claims 2 and 13 speak of a selected "range" of harmonics. Thus it was intended that the claims should be directed to a varying scope of coverage in accordance with the disclosure so that different phenomena could be monitored by analysis of either selected individual harmonics or groups of harmonics, i.e. "selected" harmonics, while other phenomena could be monitored by analysis of a "selected range of harmonics."

Applicants believe that such claim differentiation is warranted in light of the present disclosure and that claims 2 and 13 as presented do, in fact, further limit the claims from which they depend and are, therefore, properly presented.

In light of the above, Applicants respectfully request withdrawal of the Objection under 37 CFR 1.75(c) and allowance of the claims as presently presented.

REJECTION OF ORIGINAL CLAIMS 1, 5, 11, 23, 26 and 31 (35 U.S.C. 102(e)):

Original claims 1, 2, 10-13 and 21-22 stand rejected under 35 U.S.C §102(e) as being allegedly anticipated by U.S. Patent Application Publication No. 2003/0214419 (Reindl). Based on the following remarks, Applicants respectfully traverse such alleged anticipation.

Before setting forth a discussion of the prior art applied in the recent First Office Action, it is believed that a general discussion of the disclosed subject matter may be helpful as background to a discussion of the specifically claimed subject matter.

In general, the present technology is directed toward the detection of anomalies in and/or properties relating to a pneumatic tire using Doppler radar technology. More particularly, the present disclosure relates to methods and apparatus for the detection of anomalies in pneumatic tires including, but not limited to, tread separation, tread wear, uneven tread wear, tire balance and foreign body detection using Doppler Micro-Power Impulse Radar (MIR).

Prior to the present disclosure, monitoring for tire anomalies has been conducted using various techniques including the provision of devices embedded in or mounted in the vicinity of tires to be monitored. Devices such as patches mounted in a tire or

microphones mounted near a tire have been used as well as magnets embedded in the tires. In addition, ranging systems have been used to issue an alarm based on distance from a sensor to the surface of a tire. None of the previously known configurations, however, has provided a range of monitoring capabilities as provided by the present disclosure.

Thus it would be a significant advance in the art if there were a capability to provide a single methodology whereby various phenomena might be monitored by analysis of various aspects of a common sensor signal. In the present application, such capability is provided by analysis of selected harmonics and/or ranges of harmonics detected from a Doppler radar signal without the requirement of placement of sensing components such as patches within the tire itself.

With this brief background in mind, it is respectfully submitted that controlling case law has frequently addressed rejections under Sections 102.

"For a prior art reference to anticipate in terms of 35 U.S.C Section 102, every element of the claimed invention must be identically shown in a single reference." Diversitech Corp. v. Century Steps, Inc., 850 F.2d 675, 677, 7 U.S.P.Q.2d 1315, 1317 (Fed Cir, 1988; emphasis added). The disclosed elements must be arranged as in the claim under review. See Lindemann Machinefabrik v. American Hoist & Derrick Co., 730 F.2d 1452, 1458, 221 U.S.P.Q. 481, 485 (Fed. Cir. 1984). If any claim, element, or step is absent from the reference that is being relied upon, there is no anticipation. Kloster Speedsteel AB v. Crucible, Inc., 793 F.2d 1565, 230 U.S.P.Q. 81 (Fed. Cir. 1986). Anticipation under 35 U.S.C. Section 102 requires that there be an identity of invention. See Shatterproof Glass Corp. v. Libbey-Owens Ford Co., 758 F.2d 613, ___, 225 U.S.P.Q. 635, 637 (Fed. Cir. 1985). In PTO proceedings, claim language should be read in light of the specification as it would be interpreted by one of ordinary skill in the art. In re Sneed, 710 F.2d 1544, 1548, 218 U.S.P.Q. 385, 388 (Fed. Cir. 1983).

With reference now in particular to the outstanding rejection of original claims 1, 2, 10-13 and 21-22 under 35 U.S.C §102(e) as being allegedly anticipated by U.S. Patent Application Publication No. 2003/0214419 (Reindl), it should first be noticed that claim 1 is directed to "A tire monitoring apparatus comprising ... a radar transceiver ... positioned to illuminate a portion of a tire ... and to receive reflected signals from the tire

... and a signal processor ... coupled to the output of the radar transceiver ... wherein the processor is configured to perform a signal analysis based on selected harmonics of the reflected signals received by the radar transceiver and to produce an output signal at the output thereof indicative of selected tire related parameters or anomalies" (emphasis supplied). Similarly, claim 12, the only other independent claim presently presented, is directed to "A method for detecting tire related parameters comprising ... illuminating a portion of a tire with RF signals ... receiving signals reflected from the illuminated tire; and analyzing selected harmonics of the received reflected signals to detect selected tire related parameters (emphasis supplied).

With reference to claim 1 and 12, it should be noted that an important aspect to both of these independent claims is that the analysis carried out by the processor is based on illuminating the tire and reflected signals received from the tire. That is, the analysis is not based on illuminating and receiving signals from a sensor device embedded in or attached to the tire as in Reindl, but rather from illuminating the tire itself and receiving and analyzing signals from the tire *per se*.

With specific reference to Reindl, it will be seen that Reindl's disclosure relates to a method and apparatus for acquiring data of dynamic physical processes via a radio link. As explained in Reindl's Abstract:

> For acquiring data of dynamic physical processes via a radio link, a transponder antenna (17) is excited by an electromagnetic exciting wave at the resonance frequency of the transponder antenna (17), and a back-scattered electromagnetic sensor wave which is modulated by a sensor (16) having an electrical impedance depending on the data to be acquired is received and analyzed. The sensor (16) is directly connected to the transponder antenna (17) such that the sensor changes the electrical impedance of the transponder antenna (17) with every variation of the data to be acquired. The electromagnetic wave which is back-scattered by the transponder antenna (17) is received as the sensor wave at the same time as the transponder antenna (17) is excited by the exciting wave.

In addition, in the Summary Of The Invention starting in paragraph [0004], Reindl explains that:

The present invention relates to a method of acquiring data of dynamic physical processes via a radio link. The method includes the steps of arranging a sensor having an electrical impedance which depends on the data to be acquired, arranging a transponder antenna having an electrical impedance, connecting the sensor directly to the transponder antenna such that the sensor changes the electrical impedance of the transponder antenna with every variation of the data to be acquired, exciting the transponder antenna by an electromagnetic exciting wave at the resonance frequency of the transponder antenna to produce an electromagnetic wave being back-scattered by the transponder antenna and being modulated by the sensor, receiving the electromagnetic wave being back-scattered by the transponder antenna at the same time as the transponder antenna is excited by the electromagnetic exciting wave, and analyzing the electromagnetic wave being back-scattered by the transponder antenna with respect to the modulation by the sensor. (emphasis supplied)

Further at paragraph [0005], Reindl explains that:

The apparatus includes a transmitter antenna, a transponder antenna, a sensor, a receiver antenna and an analysis unit. The transmitter antenna is designed and arranged to emit an electromagnetic exciting wave. The transponder antenna has an electrical impedance, and it is designed and arranged to receive the exciting wave. The sensor has an electrical impedance depending on the data to be acquired. The sensor is directly connected to the transponder antenna in a way that the sensor changes the electrical impedance of the transponder antenna with every variation of the data to be acquired. The receiver antenna is designed and arranged to receive a back-scattered electromagnetic sensor wave being modulated by the sensor at the same time as the transmitter antenna emits the exciting wave. The analysis unit is designed and arranged to analyze the received sensor wave. (emphasis supplied)

Thus it is quite evident that Reindl has provided a sensor in the form of a transponder and antenna arrangement embedded into a tire, that he excites the transponder and receives a modulated signal from the transponder and analyzes the signal received from the transponder with respect to the modulation by the transponder. This operation is quite different from that Applicants have described and claimed that does not envision using any form of physically separate transponder to send back

modulated signals, but rather analyzes reflected microwave signals from a source of microwave energy illuminating and reflecting from the tire itself.

Further, Reindl actually teaches away from any notion of monitoring a reflected signal from the tire itself when he states at paragraph [0009]:

> Because of geometrical conditions, the amplitude of the sensor signal is far smaller than the amplitude of the read-out signal and also far smaller than many other environmental echoes. To distinguish the sensor signal from the read-out and all other interfering signals, the physical value to be measured must show a characteristic variation in time which produces a characteristic frequency shift of the sensor signal. (emphasis supplied)

With reference to claims 10, 11, 21, and 22: While Reindl does disclose a Doppler radar transceiver, he specifically excludes the concepts being taught and claimed by Applicants when he states in paragraph [0012] that:

> ... the Doppler effect is not the part of the sensor signal which carries the information of interest here. (emphasis supplied)

In the present application, the Doppler radar reflected signal is the signal of interest and an analysis thereof provides the results desired in the form of tire phenomena identification.

With reference to claims 2 and 13, Reindl suggests in paragraph [0014] that "(f)or many problems... it might be sufficient, to evaluate only the ratios between the fundamental and some higher harmonics of the sensor signal." Such a suggestion, however does not speak to the claimed concept of signal "... analysis based on a selected range of harmonics of the reflected signals..." from the tire, not from a sensor as described by Reindl.

Based on the arguments presented above with respect to present claims 1, 2, 10-13 and 21-22, Applicants submit that such claims should be allowed over Reindl. Acknowledgement of the same is earnestly solicited.

ALLOWABLE SUBJECT MATTER

Applicants note with appreciation the indication of Allowable Subject Matter with respect to claims 3-9 and 14-20 if rewritten in independent form. Applicants believe, however that, in view of the above Remarks, the claims as presently presented, including dependent claims 3-9 and 14-20 are allowable as presented and acknowledgement of the same is earnestly solicited.

CONCLUSION:

Inasmuch as all outstanding issues have been addressed, it is respectfully submitted that the present application, including claims 1-22, is in complete condition for issuance of a formal Notice of Allowance, an action to such effect is earnestly solicited. The Examiner is invited to telephone the undersigned at his convenience should only minor issues remain after consideration of this response in order to permit early resolution of the same or if he has any questions regarding this matter.

Respectfully submitted,
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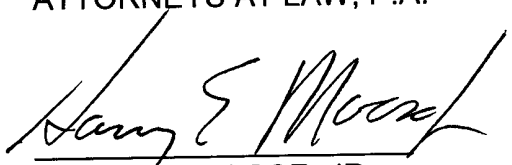

September 7, 2005
Date

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